

in the instance of the patient already quoted, who died from the subsequent inflammation set up. Fortunately, in the present case, the symptoms of the secondary danger were never very severe, and were easily controlled by mild remedies.—*Lancet*, Aug. 9th, 1850.

63. *Symptoms and Post-mortem appearances produced by Poisonous Doses of Strychnia.*—Drs. LAWRIE and COWAN read before the Medico-Chirurgical Society of Glasgow (June 10th, 1856) a very interesting account of a case of poisoning by strychnia, and the results of experiments which they had made on inferior animals, with a view of determining the symptoms and post-mortem appearances produced by poisonous doses of that drug. (See *Glasgow Medical Journal*, July, 1856, p. 162.)

As the subject is one which has lately given rise to much discussion, we shall give from the report of the proceedings of the meeting (*Glasgow Med. Journ.*, July, 1856, p. 233 *et seq.*) the principal points of interest in the paper, with some of the remarks of the various speakers.

Dr. Lawrie stated that although the chemical detection of strychnine formed no part of their inquiry, that department of the subject had not been altogether neglected. They had sent two dogs to Dr. Anderson and one to Dr. Penny, each poisoned with a quarter of a grain of strychnine, and, in all of the stomachs, the most unequivocal evidence of the presence of strychnine was afforded by all of the tests employed. Dr. Anderson found traces of it in three of the livers.¹ Dr. Easton had kindly examined urine voided by one of the dogs while under the influence of chloroform, and had, with the greatest care and certainty, discovered the presence of strychnine. This was a most important fact in several points of view; it showed the great advantage to be derived from examining this excretion in all cases of poisoning by strychnine. It further showed the most probable manner in which chloroform arrests the action of strychnine. It occurred to us that this interesting fact might depend on the inhalation of chloroform suspending the absorption of the strychnine, and, if so, it would not be found in the excretions. Dr. Easton's experiment upsets this theory, and makes it probable that the effects of the two poisons are physiologically antagonistic, and that the action of chloroform, being the more powerful, keeps the strychnine at bay so long as the effects of the inhalation continue. It also encourages the hope that if the inhalation were persisted in for a sufficiently long period, the strychnine might be entirely eliminated without exhibiting even its mildest physiological effects.

The diagnosis of strychnine poisoning and tetanus is a subject of great importance. Before the present inquiry was commenced, he (Dr. L.) had little doubt that the state of the jaw would be in a great measure diagnostic. The results of their experiments had confirmed this suspicion; for although it was true that, during the violence of the paroxysm, the jaw is spasmodically, even firmly closed, the moment relaxation occurs it can be easily and widely opened. Indeed, the animal generally lies with it open. This is not the case with tetanus. The horse that got 58 grains of strychnine illustrated this fact admirably. After 48 grains had been exhibited, and while he was powerfully under their influence, his mouth was widely opened, his tongue laid hold of, and ten grains in solution were, with the greatest ease, poured over his throat from a common beer bottle. In no case of tetanus that he had seen could this have possibly been done. It so happened that he had that day seen two cases which illustrated still further this subject. The one was a case of traumatic tetanus in a man aged fifty, the other of idiopathic opisthotonos in an infant. His mind being full of the subject, he had carefully made the following observations. The muscles of the jaw, neck, and upper part of the back of the tetanic patient were, as they have always in his experience been found in tetanus, while those of the limbs were perfectly quiescent and obedient to the will. A sudden touch on the face or any part of the body produced no spasm. The risus sar-

¹ Since the meeting of the society, Dr. Penny has most kindly examined for me, with great care, the brain and spine of a dog poisoned with strychnine, and has failed to discover the poison.—*J. A. L.*

donicus was absent. There was no excitement; on the contrary, there was that uncomplaining endurance of suffering and calm mental composure which he had always found so characteristic of this disease, even in its most acute forms. There was one peculiarity which he had never seen before in acute traumatic tetanus. The patient could not lie, but sat constantly day and night in an armed chair, with his body bent forwards and his forehead resting on a high stool placed before him. At the first glance, he thought that he had at last seen a case of emprosthotonos; but it was not so—the patient's posture was every now and again disturbed by a spasm, during which his head and neck were thrown back as in ordinary opisthotonos. The moment the paroxysm passed off he resumed his former position. No two conditions could be more markedly different than that of this man and Dr. Z., or an animal under the influence of strychnine. His pulse was quick, and although some circumstances and symptoms were favourable, he gave a very unfavourable prognosis.¹

The opisthotonos of the child seemed to depend on chronic meningitis, with effusion of serum. The spine was permanently and more completely bent than he had ever seen it, and any attempt to straighten it, or even move the little patient, gave great pain. There were no convulsive paroxysms, no closure of the jaw, and no risus sardonius. In no respect, except the opisthotonos, did the case resemble either tetanus or strychnine poisoning.

Great attention had been paid to the state of the heart in their experiments. So far as he knew, sufficient attention had not been paid by other experimenters to the effects of the rigor mortis on the heart. He believed the fact was as follows: If an animal's heart is examined *immediately* after death by strychnine, it will be found flaccid, and its four cavities filled with dark blood, sometimes (as in one of the hearts on the table) to enormous, almost incredible, over-distension; without one single exception, this was the case in all their experiments. There was not the shadow of evidence that death had been caused by spasm of the heart, and it would very greatly surprise him if reliable proof in the affirmative were ever adduced. It was far more probable, if the condition of the heart were the immediate cause of death, that it was one of paralysis. Soon after death, indeed, so far as they had observed, contemporaneously with the setting in of the rigor mortis, the left side of the heart begins to contract, and by degrees becomes firm, and, in doing so, probably empties itself.² In no case, however firm and small, had they found it empty. It generally contained dark coagula. On Palmer's trial, much was said on the state of the heart, and the bulk of the evidence went to show that in man it was empty after poisoning by strychnine. It would very much surprise him if subsequent observations did not prove that this was a fallacy. He had no manner of doubt that the same law would be found to hold good in man as in the horse and dog, and *that* law he believed they had correctly ascertained. Now, could the alleged discrepancy be reconciled? It appeared to him very easily, by presuming that the post-mortem examinations hitherto made on the human subject had not been conducted with special reference to this point, and to the quantity of blood in the other organs. The autopsy should be made as soon after death as the case permits. The pericardium must be the first cavity examined, and in doing so great care must be taken that no large vessels be opened. The heart should be carefully observed "*in situ*" undisturbed; a ligature must then be passed round the root of each lung, and two ligatures around the ascending and descending large vessels. These vessels should be cut between the ligatures, and the heart and lungs removed together. Each cavity of the heart should be opened separately, the blood taken out and weighed; and he would almost stake any little professional

¹ The patient died in two days, but unfortunately I had not an opportunity of examining the body.—J. A. L.

² In proof of this, Dr. Buchanan has since suggested and assisted in making the following experiment: Into the abdominal aorta of a dog a tube was inserted and tied immediately. After death by strychnine, the pericardium was opened, and the heart watched. As the carcass cooled, the left ventricle contracted, and blood flowed from the tube in the aorta.

reputation he might possess on the statement, that the right side of the heart will *always* be full, and the left side *never* empty. If the heart be removed in the manner generally followed, when our sole object is to ascertain the existence of structural disease, it will be *impossible* to give a correct statement of the quantity of blood it had contained. The rigor mortis has been pretty fully discussed in the paper you have heard read. He would ask how many of us have practically attended to the subject? He doubted very much if there was an individual in this crowded room who had made a single reliable observation on the human subject; and knowing this, he had read with pain the loose unguarded statements made on Palmer's trial, and he could not, without fear and trembling, contemplate the importance which had, seemingly, been attached to opinions so vague, that the bench ought not to have allowed them to be recorded.

Before sitting down, Dr. Lawrie begged to say a very few words on the practical use of chloroform inhalations in strychnine poisoning. There is a dog in this room to which a poisonous dose of strychnine was given twelve hours ago; that dog has been kept continually under chloroform during that period, and hitherto no symptom of its having swallowed strychnine has shown itself; we hope that we may keep it alive until the kidneys shall eliminate the whole strychnine.¹ But, even should we be disappointed in this, we must not conclude that it is useless as a remedy; on the contrary, by suspending the action of the poison and prolonging life, it will give time for the use of the stomach-pump and the exhibition of emetics, and enable us to sustain the strength by enemata. Further, if an antidote should ever be discovered, chloroform may be found to suspend the action of the poison until the antidote shall altogether neutralize it.²

Dr. Easton remarked, that the most important fact which had been ascertained by the essayists, was the power of chloroform to suspend the characteristic action of strychnia. These experiments Dr. Easton had been privileged to witness; and though, from the comparatively few trials which had yet been made, it could scarcely be maintained, that it had been completely established that chloroform was an antidote to strychnia, yet all the observations hitherto made were undoubtedly leading to that conclusion. By antidote, it was not meant that chloroform acted as a *chemical* antidote to strychnia, converting it into a new and innocuous substance, such as took place, for example, on the union of albumen with corrosive sublimate, or of chalk with oxalic acid; but that it raised in the system a physiological action antagonistic to that of strychnia, counteracting the spasms produced by the latter, and thereby keeping the animal alive until the poison had been eliminated by the usual channels. Chloroform merely kept the animal from dying, and thus gave nature the opportunity of working out her own recovery. Referring to the much controverted point, whether strychnia could be detected in the excretions, Dr. Easton stated that he had found no difficulty in detecting it in the urine of two of the dogs, to which Drs. Lawrie and Cowan had given respectively half a grain and one grain of the poison. Two processes were instituted for this purpose, in the conducting of which Dr. Easton had been ably assisted by Mr. William Hutton, of the chemical laboratory of Anderson's University. One of these consisted in digesting the urine, after considerable concentration, in animal

¹ In this we were disappointed; it died at 12 P. M., sixteen hours after swallowing the strychnine.

² Since the above, it occurred to me to make the following experiments:—

1. To try the effect of sulphuric ether by inhalation, in suspending the action of strychnine—it entirely failed.

2. A quarter of a grain of strychnine dissolved in $\frac{1}{2}$ chloroform, was given to a full-sized terrier; tetanic spasms came on before the animal could be untied, and he died almost instantaneously.

3. One drachm chloroform was given to a small terrier bitch, she died instantaneously.

A temporary absence has suspended our experiments; should they be resumed, the results will be communicated.—J. A. L.

charcoal, and agitating the whole for several hours. Thereafter, the animal charcoal, separated by filtration, and containing the strychnia in its interior, was boiled in alcohol, so as to dissolve out the alkaloid which had been absorbed. To the evaporated alcoholic solution, bichromate of potash and sulphuric acid were added, and the characteristic appearances of strychnia, when so treated, were immediately displayed. The other process was a little more complex. The urine was first acidulated with acetic acid and then boiled. By this means a soluble acetate of strychnia was obtained. Caustic potash and animal charcoal were then added; the potash to decompose the acetate, the charcoal to absorb the liberated strychnia. The strychnia was boiled out by alcohol from the charcoal, the filtered alcoholic solution evaporated as before, bichromate of potash and sulphuric acid were added, and with a similar result. In conclusion, Dr. Easton was of opinion that medical jurists might derive an important practical lesson, hitherto too much overlooked, from these and similar experiments. If strychnia could be detected thus readily in the urine, might not those other vegetable poisons, which were recognizable by tests, be detected in that excretion also? In particular, should we not test that fluid in cases of poisoning by opium? In cases of poisoning by that narcotic, we have hitherto been satisfied with a chemical examination of the contents of the stomach alone, and failing to find opium there, further search was deemed unnecessary, because unavailing. Now, every one who had had any experience in medico-legal investigations was aware how rapidly opium passed into the blood, and that it was impossible, if a few hours only had intervened between administration and death, for even the most expert analyst to find that poison in the stomach. If, then, there were any urine in the bladder of a person supposed to have been poisoned by that narcotic, or even by any other vegetable poison, for the discovery of which, chemistry had supplied the means, Dr. Easton was of opinion, that henceforth we should fail in our duty if we neglected to submit the excretions—nay, even the blood itself and the tissues—to the requisite chemical examination.

64. *Special Points of Similarity and Dissimilarity between the Effects on the Human Body of an Overdose of Strychnia and the Symptoms of ordinary Tetanus.*—Dr. R. ADAMS records (*Med. Times and Gaz.*, Aug. 16, 1856) an interesting case of poisoning by strychnia, and offers some interesting observations on the similarity and dissimilarity between the effects of strychnia and the symptoms of ordinary tetanus.

The diagnosis between ordinary tetanus and that form produced by strychnia, Dr. R. thinks, will be found "by looking to the expression of the countenance, rather than to any other single phenomenon. This expression is admitted by all to be most peculiar, and that once looked upon with attention it cannot be forgotten. The forehead is wrinkled transversely and in the perpendicular direction, the eyebrows being drawn in a remarkable manner towards each other; the eyes are not fully opened; the nostrils are more or less dilated; the angles of the mouth are drawn backwards and a little upwards. These characteristic marks become momentarily exaggerated at every paroxysm."

It does not appear, he says, that the true tetanic expression has been noticed in any of the cases of strychnia tetanus.

The following are Dr. A.'s conclusions:—

"1. Strychnia tetanus resembles ordinary tetanus in its spasms, particularly when they assume, as they frequently do, the form of opisthotonos.

"2. A rigid condition of the muscles exists in both cases, not only during the actual paroxysms, but also during the intervals between them.

"3. Strychnia tetanus, in its progress to a fatal result, is much more rapid in its course than ordinary tetanus.

"4. The commencement of this last is silent, and the expression of the countenance is peculiar and characteristic.

"5. The beginning of the former is announced by loud and repeated screams and moanings.

"6. The hands in strychnia tetanus are early and severely affected; in ordinary tetanus the hands are the part, of all others, the last and least affected."